PROCEEDINGS

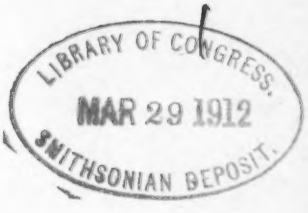
OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

VOL. XXXVIII—No. 3



March, 1912

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PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XXXVIII—No. 3

MARCH, 1912

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NEW YORK 1912

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The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.
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AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

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MINUTES OF MEETINGS OF THE SOCIETY

February 21st, 1912.—The meeting was called to order at 8.30 P. M.; A. L. Bowman, M. Am. Soc. C. E., in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 138 members and 22 guests.

A paper entitled "The Problem of the Lower West Side Manhattan Water-Front of the Port of New York," by B. F. Cresson, Jr., M. Am. Soc. C. E., was presented by the author and illustrated with lantern slides.

The paper was discussed by Messrs. T. Kennard Thomson, S. W. Hoag, Jr., H. McL. Harding, James Forgie, G. W. Kittredge, Calvin Tomkins, E. C. Moore, and Charles H. Higgins. A communication on the subject, from Edlow W. Harrison, M. Am. Soc. C. E., was presented by the Assistant Secretary.

The Assistant Secretary announced the following deaths:

Walter A. Post, elected Member March 1st, 1893; died February 11th, 1912.

William Chattin Wetherill, elected Member December 1st, 1886; died February 10th, 1912.

Adjourned.

March 6th, 1912.—The meeting was called to order at 8.45 P. M.; Director T. Kennard Thomson in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 93 members and 6 guests.

The minutes of the Annual Meeting, January 17th, and of the meeting of February 7th, 1912, were approved as printed in *Proceedings* for February, 1912.

A paper by N. B. Sweitzer, Assoc. M. Am. Soc. C. E., entitled "Retracement-Resurveys—Court Decisions and Field Procedure," was presented by the Assistant Secretary, who also read communications on the subject from Messrs. W. Newbrough and J. Francis Le Baron. The paper was discussed orally by J. L. Davis, Assoc. M. Am. Soc. C. E.

The Assistant Secretary announced the election of the following candidates on March 5th, 1912:

As Members

George Booth Baskervill, Jr., Macon, Miss.
William Benjamin Bennett, Harrisburg, Pa.
Charles Perry Chase, Clinton, Iowa
Ernest Alden Clark, Chicago, Ill.
Howard Lincoln Coburn, Boston, Mass.
Harry Cyrus Hill, Concord, N. H.
Ulysses Stanislaus Lutz, Brooklyn, N. Y.
George William Volckman, Ottawa, Ont., Canada

As Associate Members

Edgar Harold Annear, Modesto, Cal.
Frank Willis Austin, Hartford, Iowa
Ralph Pitcairn Barnett, Hempstead, N. Y.
Harold Hendryx Barter, Reno, Nev.
William Webster Chadsey, Schenectady, N. Y.
Arthur Lee Collins, San Francisco, Cal.
Harry Custer Diesem, Richfield, Idaho
Henry Gerharz, Billings, Mont.
Richard Frederick Hoffmark, Nome, Alaska
Albert Woodbridge Pioda, San Francisco, Cal.
Reuben Lynn Rockwell, Downey, Idaho
Trygve Ronneberg, San Francisco, Cal.
Alexander Douglas Stark, Kearny, N. J.
Frank William Stephens, Guantanamo, Cuba
George Edward Vansittart, Boise, Idaho

As Associates

Charles Augustus Jennings, Chicago, Ill.
Harold Beggs Pullar, Chicago, Ill.

As Juniors

Lyttleton Cooke Anderson, Memphis, Tenn.
Harold Wallace Baker, Georgetown, Del.
Alec Edward Brook, Sheffield, England
Robert William Burrowes, Long Beach, N. Y.
George Bache DuBois, Philadelphia, Pa.
Harold Lewis English, Hanover, N. H.
Frank Sampson Mason Harris, Oakland, Cal.
Arthur Kraus, New York City
Lawrence Vinnedge Sheridan, Indianapolis, Ind.
Frank Burns Storey, Portland, Ore.
Seneca Vern Taylor, Massena, N. Y.
Charles Edward Thornton, Empire, Canal Zone, Panama

The Assistant Secretary announced the transfer of the following candidates on March 5th, 1912:

From Associate Member to Member

Charles Joseph Carroll, Durango, Mexico
George Hewitt, New York City
Robert Summers Stockton, Strathmore, Alta., Canada
Henry Amerman Young, New York City

From Junior to Associate Member

Lou Baker Cleveland, Watertown, N. Y.
Arthur Wellesley Coombs, New York City
Jay Allen Craven, Indianapolis, Ind.
Arthur James Decker, Ann Arbor, Mich.
Roger DeLand French, Montreal, Que., Canada
Herbert Miller Hale, New York City
John Philip Hogan, High Falls, N. Y.
George Cheney Newton, Milwaukee, Wis.

The Assistant Secretary announced the following deaths:

John Herron, elected Member, October 4th, 1893; died February 2d, 1912.

T. Guilford Smith, elected Member, September 6th, 1871; died February 20th, 1912.

Adjourned.

OF THE BOARD OF DIRECTION.

(Abstract)

March 5th, 1912.—Past-President Bates in the chair; T. J. McMinn, Asst. Secretary, acting as Secretary; and present, also, Messrs. Belknap, Bensel, Bush, Endicott, Gerber, Knap, Loomis, Loweth, Ridgway, Roberts, Snow, Staniford, and Thomson.

Tuesday, June 4th, 1912, was chosen as the time for the opening session of the Annual Convention.

The resignations of 3 Juniors and 1 Associate were accepted.

Ballots for membership were canvassed, resulting in the election of 8 Members, 15 Associate Members, 2 Associates, and 12 Juniors, and the transfer of 8 Juniors to the grade of Associate Member.

Four Associate Members were transferred to the grade of Member.

Applications were considered, and other routine business transacted.

Adjourned.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

April 3d, 1912.—8.30 P. M.—This will be a regular business meeting. A paper by Louis H. Shoemaker, M. Am. Soc. C. E., entitled "A Four-Track Center-Bearing Railroad Draw Span," will be presented for discussion.

This paper is printed in this number of *Proceedings*.

April 17th, 1912.—8.30 P. M.—At this meeting a paper by Burgis G. Coy, Assoc. M. Am. Soc. C. E., entitled "The Laramie-Poudre Tunnel," will be presented for discussion.

This paper is printed in this number of *Proceedings*.

May 1st, 1912.—8.30 P. M.—A regular business meeting will be held, and a paper entitled "Faults in the Theory of Flexure," by Henry S. Prichard, M. Am. Soc. C. E., will be presented for discussion.

This paper is printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-fourth Annual Convention will be held at Saratoga, N. Y., June 4th, 1912.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society, in this manner, has been expressed frequently, and leaves little doubt that, if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work, the Appendices* to the Annual Reports of the Board of Direction for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and, on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions, only, will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

* *Proceedings*, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Gavin N. Houston, M. Am. Soc. C. E., 409 Equitable Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, and, until further notice, will take place at the Colorado Traffic Club.

Visiting members are urged to attend the meetings and luncheons.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms and at all Meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Civis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniorforening, Amaliegade 38, Copenhagen, Denmark.

Engineers' and Architects' Club of Louisville, Ky., 303 Norton Building, Fourth and Jefferson Streets, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.

Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.

Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.

Engineers' Society of Northeastern Pennsylvania, 302 Board of Trade Building, Scranton, Pa.

Engineers' Society of Pennsylvania, 219 Market Street, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburgh, Pa.

Institute of Marine Engineers, 58 Romford Road, Stratford, London, E., England.

Institution of Engineers of the River Plate, Buenos Aires, Argentine Republic.

Institution of Naval Architects, 5 Adelphi Terrace, London, W. C., England.

Junior Institution of Engineers, 39 Victoria Street, Westminster, S. W., London, England.

Koninklijk Instituut van Ingenieurs, The Hague, The Netherlands.

Louisiana Engineering Society, 321 Hibernia Bank Building, New Orleans, La.

Memphis Engineering Society, Memphis, Tenn.

Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.

Montana Society of Engineers, Butte, Mont.

North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, England.

Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.

Pacific Northwest Society of Engineers, 803 Central Building, Seattle, Wash.

Rochester Engineering Society, Rochester, N. Y.

Sachsischer Ingenieur- und Architekten-Verein, Dresden, Germany.

Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingenieurs Civils de France, 19 Rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18–1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From February 10th to March 9th, 1912)

DONATIONS *

THE ECONOMICS OF CONTRACTING.

A Treatise for Contractors, Engineers, Superintendents and Foremen Engaged in Engineering Contracting Work. By Daniel J. Hauer. Cloth, 8¾ x 5½ in., illus., 269 pp. Chicago, E. H. Baumgartner, 1911. $2.50.

It is stated in the preface that this book is a study of the principles and history of the business of contracting, the author using his own experience and knowledge gleaned from others as a basis. The subject-matter relates to the fundamentals affecting the economics of the contracting business, as well as methods, equipment, and organization used in modern construction work. The author hopes that the older contractors may find in the treatise some thoughts and ideas that may be useful, and that the younger men may learn how to guard against both loss of time and money in eliminating mistakes made by others. The Contents are: Contracting as a Profession; Forms of Contract; Proposals, Bonds, Arbitration, and Other Features of Contracts; The Business End of Contracting; The Clerical End of Contracting; Contractors' Workmen; Construction Camps; The Management of Contracts; Contractors' Outfit and Plant; A Personal Chapter for the Contractor; Addena: Changing Plans After a Contract is Awarded; Onerous Specifications; Books for Contractors.

A LABORATORY MANUAL OF PHYSICS AND APPLIED ELECTRICITY.

Arranged and Edited by Edward L. Nichols. Vol. I, Junior Course in General Physics, Revised and Rewritten by Ernest Blaker. Cloth, 9 x 6 in., illus., 13 + 417 pp. New York, The Macmillan Company, 1912. $3.00.

As a result of the changes which have been made in the treatment of many of the experiments included in the first edition of this book, the present edition of Volume I of this Manual is stated to have been almost entirely rewritten, a few of the earlier experiments having been omitted and about forty new ones having been added. In the preface to the first edition, it is stated that this volume is intended for beginners in laboratory work, who possess some knowledge of analytical geometry and calculus and who have completed a textbook and lecture course in the principles of physics, and that it includes explicit directions, together with demonstrations and occasional elementary statements of principles, no attempt being made to include the whole of physics. In the Introduction it is stated that the object of the experiments described is to illustrate the principles and laws previously learned from textbooks and lectures and to familiarize the student with proper methods of observation and physical experimentation. The Chapter headings are: Introduction; Curvature of a Lens by the Spectrometer, etc.; General Statements Concerning Density; General Statements Concerning Calorimetry; Radius of Curvature by Reflection, etc.; General Statements Concerning Photometry; Measurement of Pitch by the Syren, etc.; General Statements Concerning Static Electricity; General Statements Concerning Magnetism; General Statements Concerning the Electric Current; General Statements Concerning Difference of Potential and Electromotive Force; General Statements Concerning Resistance; General Statements Concerning Electrical Quantity; General Statements Concerning Induction; General Statements Concerning the Magnetic Properties of Iron; Tables; Index.

PORTLAND CEMENT

Its Composition, Raw Materials, Manufacture, Testing and Analysis. By Richard K. Meade. Second Edition. Cloth, 9 x 6 in., illus., 10 + 512 pp. Easton, Pa., The Chemical Publishing Co.; London, Williams & Norgate, 1911. $4.50.

The first edition of this book was published in 1906, and for the present edition, the author states that the entire text has been revised. After an Introduction, the author discusses the manufacture of Portland cement and describes the various appliances used in this connection, stating that this section represents fairly

* Unless otherwise specified, books in this list have been donated by the publisher.

well the present state of the industry in the United States. The subject-matter relating to the Analytical Methods described, has been increased. These methods have been used to some extent in the author's laboratory and have been found satisfactory. Under the heading "Notes," comments as to its accuracy and advice as to the best method of manipulation are added to each method described. The section on Physical Testing has been revised, it is stated, to conform to the changes made in the standard specifications and methods of testing, much new matter having been added. Under the section, Miscellaneous, the author discusses adulteration in Portland cement and has added a new chapter relating to the investigation of materials used in its manufacture. The Contents are: Introduction: Relation Between Mortar Materials and History of the Development of the American Portland Cement Industry; The Nature and Composition of Portland Cement. Manufacture: Raw Materials; Proportioning the Raw Materials; Quarrying, Excavating, Drying, and Mixing the Raw Materials; Grinding the Raw Materials and Grinding Machinery; Burning-Kilns and Process; Burning-Fuel and Preparation of the Same; Cooking and Grinding the Clinker; Storing and Packing the Cement, etc. Analytical Methods: The Analysis of Cement; The Analysis of Cement Mixtures; Analysis of the Raw Materials. Physical Testing: The Inspection of Cement; Specific Gravity; Fineness; Time of Setting; Tensile Strength; Soundness. Miscellaneous: The Detection of Adulteration in Portland Cement; The Investigation of Materials for the Manufacturing of Portland Cement. Appendix: Tables; Index.

AËRIAL NAVIGATION.

A Popular Treatise on the Growth of Air Craft and on Aëronautical Meteorology. By Albert Francis Zahm. Cloth, 8¼ x 5½ in., illus., 17 + 497 pp. New York and London, D. Appleton and Company, 1911. $3.00.

The purpose of this work, it is stated, is to portray in popular terms the substantial progress of aeronautics from its earliest beginning to the present time. Experiments which constitute no advance in the art or have led to no useful result, are not included except in the introductory chapter. After describing the evolution of aeronautics, the author gives a brief account of the general properties of the air which affect its density and also of the generation and prevalence of the great currents of the atmosphere and the local winds and invisible turmoils which concern the safety and effective progress of the aviator. French units of measurement are used as well as English ones, as the official rules and records of international aeronautic events are partly expressed in the metric system. The Appendices are stated to contain interesting historical facts and much quantitative data of interest to the technical and special student. The Contents are: Introduction; Part I, Growth of Aerostation: Early History of Passive Balloons; Practical Development of Passive Balloons; Early History of Power Balloons; Introduction of Gasoline-Driven Dirigibles; Practical Development of Non-Rigid Dirigibles; Development of Rigid Dirigibles. Part II, Growth of Aviation: Model Flying Machines; Nineteenth Century Man-Flyers; Aeroplanes of Adequate Stability and Power; Advent of Public Flying; Strenuous Competitive Flying; Forcing the Art. Part III, Aeronautic Meteorology: General Properties of Free Air; General Distribution of Heat and Pressure; Permanent and Periodic Winds; Cyclones, Tornadoes, Water Spouts; Thunderstorms, Wind Gusts. Appendices: Stress in a Vacuum Balloon; Aeronautic Letters of Benjamin Franklin; Successful Military Dirigible Balloons; The Relations of Weight, Speed, and Power of Flyers; Curtiss' Hydro-Aeroplane Experiments; Index.

A MANUAL OF ENGINEERING DRAWING

For Students and Draftsmen. By Thomas E. French. Cloth, 9¼ x 6 in., illus., 11 + 289 pp. New York, McGraw-Hill Book Company, 1911. $2.00.

The author defines Engineering Drawing as the language used in the industrial world by engineers and designers to express and record the ideas and information necessary for the building of machines and structures, and by the aid of which every necessary operation is minutely described and complete records kept for duplication or repairs. When done with the aid of mathematical instruments, it is called Mechanical Drawing, which, it is stated, develops accuracy of measurement and manual dexterity; when done without the assistance of instruments or appliances, it is known as Technical Sketching which trains the student to comprehensive observation and gives him control and mastery of form and proportion. The author states that the first step in the study of Engineering Drawing is familiarity with the necessary instruments and ability to use them correctly, after which the student's whole energy should be directed toward training in construc-

tive imagination, as his success will depend not only on his skill in execution, but also on his ability to interpret his impressions, to visualize quickly and accurately. As the best illustrations of principles described, the author has used machine parts, and he has also added chapters on architectural and map drawing, as it is necessary for every engineer to be able to read and work from such drawings. The Chapter headings are: Introductory; The Selection of Instruments; The Use of Instruments; Applied Geometry; Lettering; Orthographic Projection; Developed Surfaces and Intersections; Pictorial Representation; Working Drawings; Technical Sketching; The Elements of Architectural Drawing; Map and Topographical Drawing; Duplication, and Drawing for Reproduction; Notes on Commercial Practice; Bibliography of Allied Subjects; Index.

THE PRACTICAL GAS AND OIL ENGINE HAND-BOOK.

A Manual of Useful Information on the Care, Maintenance and Repair of Gas and Oil Engines. By L. Elliott Brookes. Cloth, 6¾ x 4½ in., illus., 192 pp. Chicago, Frederick J. Drake & Co., 1911. $1.00.

The author's intention in this book is to furnish practical information regarding the construction, operation, and management of gas, gasoline, and kerosene engines, and he states that it gives full instructions on all points relating to the care, maintenance, and repair of stationary, portable, marine and automobile, gas and oil engines, including how to start, how to stop, how to adjust, how to repair, and how to test them. The information is said to be presented in a clear and practical manner, all technical matter being avoided as far as possible.

STORAGE BATTERIES.

The Chemistry and Physics of the Lead Accumulator. By Harry W. Morse. Cloth, 7½ x 5 in., illus., 266 pp. New York, The Macmillan Company, 1912. $1.50.

In his introductory chapter the author states that a study of the storage battery has two rather distinct viewpoints of nearly equal importance, namely, chemical and physical, questions about the fundamental reactions being purely chemical and must be kept in mind in manufacture and operation, while questions of the life of the cell and its behavior in service are physical and of prime importance. The viewpoints are discussed by the author, but no attempt has been made to give any details of storage battery engineering, the peculiarities of the cell itself only being described for the reader's benefit. It is stated that the subject-matter is based on lectures given for the last few years at Harvard University, in a course in which the work on storage cells is preceded by study of the general theory of galvanic cells, and the simplest of this theory has been included in the book. The Contents are: Introductory and Historical; Some Electrochemical Fundamentals; About Ions; The Fundamental Cell-Reaction; The Active Ions; Some Pertinent Physical Queries; Energy Relations; Reactions at the Electrodes; Charge and Discharge; Capacity; Efficiency; Internal Resistance; Physical Characteristics; Formation of Planté Plates; Paste Plates; Diseases and Troubles; Some Commercial Types; Accumulators in General; Appendix; Index.

CEMENT PIPE AND TILE.

Advantages of Cement for Pipe and Tile, Methods of Manufacture, Tests, Cost, etc. By E. S. Hanson. Second Edition. Cloth, 7¾ x 5 in., illus., 153 pp. Chicago, The Cement Era Publishing Company, 1911. $1.00. (Donated by the Author.)

The author's aim has been to bring together, as far as possible, in one place all matter relating to each phase of the cement pipe and tile industry, and he hopes the book will be useful in the upbuilding of what he believes is destined to be one of the most important lines of endeavor in the use of cement. Like the previous edition issued less than three years ago, the work is stated to be largely a compilation, but, owing to the rapid development of the industry, it differs widely from the first edition, and includes much information gathered by the author from personal visits to many pipe and tile plants. The Contents are: Introduction; Advantages of Cement for Pipe and Tile; Concrete Pipe Sewers; Pipe for Pressure Service; Concrete Pipe for Culverts; Establishing a Plant; The Materials Required; Methods of Manufacture; Curing; The Matter of Costs; Tests; Machines and Systems on the Market (Present-Day Systems Illustrated and Reviewed); Index.

ENGINEERING AS A VOCATION.

By Ernest McCullough, M. Am. Soc. C. E. Cloth, 8¼ x 5½ in., illus., 201 pp. New York, David Williams Company, 1911. $1.00.

The preface states that the subject-matter contained in this book was first given as a series of addresses before technical schools and engineering assistants. The author has rearranged and added to the text and states that it is issued in book form "for the information of parents in order that they may act wisely in selecting careers for their sons." He outlines the personal qualities necessary to a successful engineer, the work that will be required of him, his education, comparing the American system with that of Europe, etc., and states that his opinions in regard to wholesale technical education do not coincide with those generally found in semi-technical periodicals and daily newspapers. The Chapter headings are: The Engineer; The Work of the Engineer; The Education of the Engineer; Home Study Courses; How to Hunt and Hold a Job; Does It Pay to Study Engineering?; The Opinions of Engineering Editors.

COMMISSION GOVERNMENT IN AMERICAN CITIES.

By Ernest S. Bradford. Cloth, 7½ x 5 in., illus., 14 + 359 pp. New York, The Macmillan Company, 1911. $1.25.

Of the recent developments in the field of municipal politics the author states that none has attracted more attention than the introduction and rapid rise of the Commission Form of city government, so-called from the commission or board which constitutes the governing body. Starting in 1900 in Galveston, Tex., the idea has spread from the Gulf to the North Central States, to New England, and to the Pacific Coast, and in August, 1911, it is stated that more than 150 American cities of varying population and representing all sections had adopted the Commission Form of government, with modifications and additions to suit local conditions. The aim of this book is to inquire as to the rise of the plan, the reasons for its adoption by the various municipalities, and the degree of success attained in such municipalities. An analysis of the idea into its elements has also been made, as well as an attempt to account for certain of the results which have followed its adoption, and it is hoped that the data here presented may throw some light on the workings of the plan as far as adopted. The Contents are: Part I, Spread of the Commission Form: Galveston; Houston; Des Moines; Cedar Rapids; Cities of Kansas; States of Upper Mississippi Valley; Texas and Oklahoma; Massachusetts; West Virginia, Tennessee, and the South; Colorado and the Pacific States, Preferential Voting; Summary of Commission Cities; The Business City Manager—Staunton, Va. Part II, A Comparison of Forms of Commission Government: Commission Government, Essential Features; The Small Board; Election at Large, A Redefinition of Representation; Concentration of Municipal Authority; Each Commissioner Head of a Department; "Checks"; Publicity; Referendum and Initiative; The Recall; Non-partisan Primaries and Elections, Preferential Voting; Municipal Civil Service, Other Provisions; Summary of "Checks," Classification of Commission Cities; Unusual and Partial Forms of Commission Government; Limitations of the Commission Form; Objections to Commission Government; Conclusion; Preferential Ballot Provisions of Grand Junction; Text of Iowa Law (Des Moines Plan); List of References; Index.

COMMISSION GOVERNMENT IN AMERICAN CITIES.

The Annals of the American Academy of Political and Social Science, Vol. XXXVIII, No. 3, November, 1911. Emory R. Johnson, Editor. Paper, 10 x 7 in., illus., 6 + 273 pp. Philadelphia, The American Academy of Political and Social Science, 1911. $1.00.

This work is the fifth of a series of studies on municipal government issued by the Academy and was planned by Dr. Clyde L. King, of the Department of Political Science in the University of Pennsylvania. This collection of papers by men who have studied the question, is believed, it is stated, to be of special value on a subject of wide interest and permanent import. The Contents are: Part I, Underlying Principles and Typical Plans; Part II, Problems of Commission Government; Part III, Objections, Limitations and Modifications of the Plan; Part IV, Results of Commission Government in Typical Cities.

THE ESSENTIALS OF LETTERING.

A Manual for Students and Designers. By Thomas E. French and Robert Meiklejohn. Third Edition, Revised and Enlarged. Cloth, 6½ x 9 in., illus., 7 + 94 pp. New York and London, McGraw-Hill Book Company, 1912. $1.00.

This book is designed, it is stated, as a general textbook on the subject of lettering, and is intended for art students, artists, designers, etc., as well as for engineering students, draftsmen, and architects. For the student who expects to do

serious work on lettering, it is said to be only an introduction, the author's aim being to give an adequate number of practical working styles for the ordinary draftsman and designer, with examples of composition in sufficient variety to illustrate the text. The first four chapters are devoted to the fundamental forms of lettering as used in office drawings and the rules on which they are based. The remaining chapters are intended for the use of the designer. There is a bibliography containing a list of books for those who desire to study the subject further, some of which are especially adapted for the designer's library. The Contents are: Historical Outline; Letter Construction; Composition and Titles; Selection of Styles; Letters in Design; Design and Composition; Monograms, Ciphers and Marks; Drawing for Reproduction; Bibliography; Index.

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The Irrigation of Mesopotamia. By Sir W. Willcocks. 2 Vol. Spon & Chamberlain, New York; E. & F. N. Spon, London, 1911.

Naval Architecture. By Cecil H. Peabody. Third Edition, Revised and Enlarged. John Wiley & Sons, New York; Chapman & Hall, Limited, London, 1911.

Modern Practice in Mining: Vol. IV, The Ventilation of Mines. By R. A. S. Redmayne. Longmans, Green and Co., New York and London, 1911.

American Society for Testing Materials: Proceedings of the Fourteenth Annual Meeting Held at Atlantic City, N. J., June 27th–July 1st, 1911. Vol. XI. University of Pennsylvania, Philadelphia, 1911.

Poor's Manual of Railroads of the United States Street Railway and Traction Companies. Forty-fourth Annual Number. Poor's Railroad Manual Co., New York, 1911.

The Magnetic Circuit. By V. Karapetoff. McGraw-Hill Book Company, New York and London, 1911.

The Induction Motor. By Benjamin F. Bailey. McGraw-Hill Book Company, New York and London, 1911.

Metallurgy: Vol. I, Introductory. By Herbert Lang. McGraw-Hill Book Company, New York and London, 1911.

Centrifugal Pumps: Their Design and Construction. By Louis C. Lowenstein and Clarence P. Crissey. D. Van Nostrand Company, New York, 1911.

Der Städtische Tiefbau: Band I, Die Städtischen Strassen, von Ewald Genzmer (2 vol.); Band III, Die Städtereinigung, von F. W. Büsing; Band V, Zweites Heft, Die Versorgung der Städte mit Electricität, von Oskar von Miller. Arnold Bergsträsser, A. Kroner, Stuttgart, 1897–1903.

SUMMARY OF ACCESSIONS

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RESIGNATIONS

ASSOCIATE	Date of Resignation.
STOWE, CHARLES BROWN	Mar. 5, 1912
JUNIORS	
CHACE, AMASA MANTON	Feb. 6, 1912
EWING, WILLIARD REA	Feb. 6, 1912
FEUSTEL, ROBERT MAXIMILIAN	Mar. 5, 1912
TRASK, WARREN DUDLEY	Mar. 5, 1912
WILLCOX, JAMES DEWITT	Mar. 5, 1912

DEATHS

HERRON, JOHN. Elected Member, October 4th, 1893; died February 2d, 1912.

POST, WALTER A. Elected Member, March 1st, 1893; died February 11th, 1912.

SMITH, T. GUILFORD. Elected Member, September 6th, 1871; died February 20th, 1912.

WETHERILL, WILLIAM CHATTIN. Elected Member, December 1st, 1886; died February 10th, 1912.

Total Membership of the Society, March 9th, 1912, 6 401.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(February 9th to March 8th, 1912)

NOTE.—*This list is published for the purpose of placing before the members of the Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.*

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

(1) *Journal*, Assoc. Eng. Soc., 31 Milk St., Boston, Mass., 30c.
(2) *Proceedings*, Engrs. Club of Phila., 1317 Spruce St., Philadelphia, Pa.
(3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
(4) *Journal*, Western Soc. of Engrs., Monadnock Blk., Chicago, Ill., 50c.
(5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
(6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
(8) *Stevens Institute Indicator*, Stevens Inst., Hoboken, N. J., 50c.
(9) *Engineering Magazine*, New York City, 25c.
(10) *Cassier's Magazine*, New York City, 25c.
(11) *Engineering* (London), W. H. Wiley, New York City, 25c.
(12) *The Engineer* (London), International News Co., New York City, 35c.
(13) *Engineering News*, New York City, 15c.
(14) *Engineering Record*, New York City, 10c.
(15) *Railway Age Gazette*, New York City, 15c.
(16) *Engineering and Mining Journal*, New York City, 15c.
(17) *Electric Railway Journal*, New York City, 10c.
(18) *Railway and Engineering Review*, Chicago, Ill., 15c.
(19) *Scientific American Supplement*, New York City, 10c.
(20) *Iron Age*, New York City, 20c.
(21) *Railway Engineer*, London, England, 25c.
(22) *Iron and Coal Trades Review*, London, England, 25c.
(23) *Bulletin*, American Iron and Steel Assoc., Philadelphia, Pa.
(24) *American Gas Light Journal*, New York City, 10c.
(25) *American Engineer*, New York City, 20c.
(26) *Electrical Review*, London, England.
(27) *Electrical World*, New York City, 10c.
(28) *Journal*, New England Water-Works Assoc., Boston, Mass., $1.
(29) *Journal*, Royal Society of Arts, London, England, 15c.
(30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium.
(31) *Annales* de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand, Brussels, Belgium.
(32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
(33) *Le Génie Civil*, Paris, France.
(34) *Portefeuille Economiques des Machines*, Paris, France.
(35) *Nouvelles Annales de la Construction*, Paris, France.
(36) *Cornell Civil Engineer*, Ithaca, N. Y.
(37) *Revue de Mécanique*, Paris, France.
(38) *Revue Générale des Chemins de Fer et des Tramways*, Paris, France.
(42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, $1.
(43) *Annales des Ponts et Chaussées*, Paris, France.
(44) *Journal*, Military Service Institution, Governors Island, New York Harbor, 50c.
(45) *Mines and Minerals*, Scranton, Pa., 25c.
(46) *Scientific American*, New York City, 15c.
(47) *Mechanical Engineer*, Manchester, England.
(48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany.
(49) *Zeitschrift für Bauwesen*, Berlin, Germany.
(50) *Stahl und Eisen*, Düsseldorf, Germany.
(51) *Deutsche Bauzeitung*, Berlin, Germany.
(52) *Rigasche Industrie-Zeitung*, Riga, Russia.
(53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria.
(54) *Transactions*, Am. Soc. C. E., New York City, $4.
(55) *Transactions*, Am. Soc. M. E., New York City, $10.
(56) *Transactions*, Am. Inst. Min. Engrs., New York City, $6.

(57) *Colliery Guardian*, London, England.
(58) *Proceedings*, Engrs.' Soc. W. Pa., 803 Fulton Bldg., Pittsburgh, Pa., 50c.
(59) *Transactions*, Mining Inst. of Scotland, London and Newcastle-upon-Tyne, England.
(60) *Municipal Engineering*, Indianapolis, Ind., 25c.
(61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
(62) *Industrial World*, 59 Ninth St., Pittsburgh, Pa., 10c.
(63) *Minutes of Proceedings*, Inst. C. E., London, England.
(64) *Power*, New York City, 5c.
(65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
(66) *Journal of Gas Lighting*, London, England, 15c.
(67) *Cement and Engineering News*, Chicago, Ill., 25c.
(68) *Mining Journal*, London, England.
(70) *Engineering Review*, New York City, 10c.
(71) *Journal*, Iron and Steel Inst., London, England.
(71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
(73) *Electrician*, London, England, 18c.
(74) *Transactions*, Inst. of Min. and Metal., London, England.
(75) *Proceedings*, Inst. of Mech. Engrs., London, England.
(76) *Brick*, Chicago, Ill., 10c.
(77) *Journal*, Inst. Elec. Engrs., London, England.
(78) *Beton und Eisen*, Vienna, Austria.
(79) *Forscherarbeiten*, Vienna, Austria.
(80) *Tonindustrie Zeitung*, Berlin, Germany.
(81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
(83) *Progressive Age*, New York City, 15c.
(84) *Le Ciment*, Paris, France.
(85) *Proceedings*, Am. Ry. Eng. and M. of W. Assoc., Chicago, Ill.
(86) *Engineering-Contracting*, Chicago, Ill., 10c.
(87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
(88) *Bulletin* of the International Ry. Congress Assoc., Brussels, Belgium.
(89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa.
(90) *Transactions*, Inst. of Naval Archts., London, England.
(91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
(92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
(93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
(94) *The Boiler Maker*, New York City, 10c.
(95) *International Marine Engineering*, New York City, 20c.
(96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
(98) *Journal*, Engrs. Soc. Pa., 219 Market St., Harrisburg, Pa., 30c.
(99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, $1.50.
(100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
(101) *Metal Worker*, New York City, 10c.
(102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
(103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
(104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
(105) *Metallurgical and Chemical Engineering*, New York City, 25c.
(106) *Transactions*, Inst. of Mining Engrs., London, England, 6 shillings.
(107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
(108) *Southern Machinery*, Atlanta, Ga., 10c.

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Bridges.

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The St. Louis Municipal Bridge.* S. W. Bowen. (13) Feb. 8.
Cost of Concrete Highway Bridges. B. H. Piepmeier. (Abstract of paper presented to Illinois Soc. of Engrs. and Surveyors.) (13) Feb. 8.
Preliminary Studies in Bridge Design.* Reginald Ryves, Assoc. M. Inst. C. E. (104) Serial beginning Feb. 9.
New Radcliffe Viaduct on Great Northern of England.* C. Van Langendonck. (15) Feb. 9.
The Construction of the Huai River Bridge.* (14) Feb. 10.
An Electrically Operated Bascule Bridge.* Frank C. Perkins. (62) Feb. 12.
Specifications for and Cost of Replacing Wood Floors with Reinforced Concrete for Highway Bridges. Leroy C. Smith. (86) Feb. 14.
Reinforced Concrete Bridges Built Over Current River, in the City of Port Arthur, Ontario.* L. M. Jones. (96) Feb. 15.
The Saybrook Bridge on the Connecticut River.* Edward W. Bush. (Paper read before the Connecticut Soc. of Engrs.) (14) Feb. 17.

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Bridges—(Continued).

Repairing the Substructure of the Bangor-Brewer Bridge. E. B. Greenwood. **(14)** Feb. 24.
Pneumatic Caissons at Fort William.* A. Gillies. **(96)** Feb. 29.
A Concrete Retaining Wall Failure.* **(13)** Feb. 29.
Replacing the Hancock Bridge.* **(14)** Mar. 2.
Waterproofing Concrete-Slab Railroad Bridges over Streets. **(14)** Mar. 2.
Concrete Water Barrels for Trestle Protection. Hunter McDonald. (Paper to be presented to Eng. Assoc. of the South.) **(14)** Mar. 2.
The Central Avenue Bridge at Rochester: A Reinforced Concrete Structure Combined with a Concrete Dam.* **(14)** Mar. 2.
Pont en Beton Armé, au Suquet.* James Boudet. **(35)** Feb.
Der Brückenbau in den letzten Jahren.* A. Rohn. **(107)** Jan. 27.

Electrical.

Wood and Concrete Poles in Electrical Service.* W. Monktelow. **(26)** Serial beginning Feb. 2.
Radio-Telegraphy.* G. W. Osborn Howe, M. I. E. E. **(29)** Feb. 2.
A New Electrical Ship's Telegraph Apparatus.* **(26)** Feb. 9.
New Power Station at Bury.* **(73)** Feb. 9; **(26)** Feb. 9.
The Distribution of Current and the Variation of Resistance in Linear Conductors of Square and Rectangular Cross-Section When Carrying Alternating Currents of High Frequency.* H. W. Edwards. (Abstract from *Physical Review.*) **(73)** Feb. 9.
Cost of Power Generated in Isolated Plants.* **(20)** Feb. 15.
Mechanical Electro-Galvanizing.* (Paper read before the National Electro-Platers' Assoc.) **(20)** Feb. 15.
Preservation of Power Transmission Poles. W. R. Wheaton. (Abstract of paper read before the Wood Preservers' Assoc.) **(96)** Feb. 15.
Electric Power in South East Kent.* **(26)** Feb. 16.
The Use of Batteries on Alternating Current Systems.* **(12)** Serial beginning Feb. 16.
Electric Power Station at Bahia Blanca.* **(12)** Feb. 16.
An Electric Furnace for Heating Bars and Billets. F. F. Baily. (Abstract of paper read before the Am. Electrochemical Soc.) **(73)** Feb. 16.
Electric Potential in Alternating Magnetic Fields.* C. F. Jenkin. **(73)** Serial beginning Feb. 16.
A Machine for the Calculation of Supply Networks.* J. Nowak. (Abstract from *Elektrotechnische Zeitschrift.*) **(73)** Feb. 16.
Artificial Power-Transmission Line.* A. E. Kennelly and H. Tabossi. **(27)** Feb. 17.
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Electrical Developments in Stratford-on-Avon.* **(26)** Feb. 23.
Degradation of Accumulative Energy.* A. G. Collis, A. M. I. E. E. (Abstract of paper read before the South Wales Inst. of Engrs.) **(22)** Feb. 23.
Hydroelectric Station for Northern Illinois Companies.* **(27)** Feb. 24.
Some Problems of High-Voltage Transmissions. Charles P. Steinmetz. **(42)** Mar.
Characteristics of Protective Relays. E. M. Hewlett. **(42)** Mar.
Refractories (For Electric Furnaces). Francis A. J. FitzGerald. **(105)** Mar.
Operation of Two Alternating Current Stations Through Parallel Circuits, and the Distribution of Load and Wattless Currents Between Them.* J. W. Welsh. **(42)** Mar.
Air Gap Flux Distribution in Direct-Current Machines.* Charles R. Moore. **(42)** Mar.
Purity a Requisite for Silver Electroplating Anodes. J. L. R. Brown. (Paper read before the National Electroplaters' Assoc.) **(105)** Mar.
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Electrical Disturbances and the Nature of Electrical Energy. Charles P. Steinmetz. (Paper read before the Assoc. of Edison Illuminating Companies.) **(19)** Mar. 2.
La Station Centrale Electrique d'Eberswalde près de Berlin.* **(33)** Jan. 13.
Le Commutateur Téléphonique Automatique: Système Bétulander.* P. Chignaterie. **(33)** Feb. 10.
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Sea-Going Gas Driven Cargo Vessel.* **(12)** Feb. 16.
100-Shaft-Horse Power Diesel Marine Engine.* **(11)** Feb. 16.
A Further Note on Approximate Stability.* (Ships.) Arthur R. Liddell. **(12)** Feb. 23.
Semi-Diesel Engine on the Yacht *Mairi*.* **(11)** Feb. 23.
Floating Dock for Testing Submarine Boats.* **(11)** Feb. 23.
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Progress in Marine Engineering During the Past Fifteen Years. W. F. Durand. **(95)** Mar.
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Moteur à Combustion à Deux Temps, Système Junkers.* **(33)** Feb. 10.
Die Verwendung von Dieselmaschinen zum Antrieb von Grösseren Seeschiffen.* W. Kaemmerer. **(48)** Serial beginning Jan. 20.
Entwurf zu einem Schiffshebewerk von 36m Hubhöhe.* **(51)** Serial beginning Feb. 14.

Mechanical.

Should Exhaust-Steam Be Wasted? P. Barrett Coulston. (Paper read before the Manchester Geol. and Min. Soc.) **(106)** Vol. 42, Pt. 3.
Some Recent Developments in Testing Boiler Tubes.* F. N. Speller. **(89)** Vol. 11.
Practice Recommended for Annealing Miscellaneous Rolled and Forged Carbon-Steel Objects. Amer. Soc. for Testing Materials. **(89)** Vol. 11.
A New Type of Autographic Transverse Testing Machine for Research Testing or Regular Foundry Practice. T. Y. Olsen. **(89)** Vol. 11.
A New Method of Testing the Indurance of Case-Hardened Gears and Pinions.* J. S. MacGregor and Bradley Stoughton. **(89)** Vol. 11.
A Study of Mechanical Conveyors.* Lincoln DeG. Moss. **(6)** Jan.
Steam Power Plants.* O. S. Lyford, Jr., and R. W. Stovel. **(58)** Jan.
Making Dies for Forging Machines.* J. Martin. (Abstract of paper read before the Am. Ry. Tool Foremen's Assoc.) **(108)** Feb.
Elements of Ball and Roller Bearing Design.* Arnold C. Koenig. (Paper read before the Soc. of Automobile Engrs.) **(108)** Feb.
Surface Combustion.* William A. Bone. **(3)** Feb.
Calculations for the Bracing of Flat Surfaces in Boilers.* J. P. Morrison. **(94)** Feb.
The Suckling Water-Tube Boiler.* **(11)** Feb. 2.
Boilers Fired with Liquid Fuel. Giulio Fumanti. (Abstract of translation of paper read before the Congresso Nazionale di Ingegnieria Navale e Meccanica.) **(11)** Serial beginning Feb. 2.
Mechanical Stokers at the Alexandra (Newport and South Wales) Docks and Railway.* **(57)** Feb. 2.
Concerning the Centrifugal Treatment of Carburetted Water-Gas Tar.* J. M. Muller. **(66)** Feb. 6.
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McLean's Compensated Draught Furnaces.* **(11)** Feb. 9.
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The Leakage of Steam Past Piston Valves.* H. Denzil Lobley. **(12)** Feb. 9.
Plants for Sulphate of Ammonia.* C. G. Atwater. (Paper read before the Am. Gas Institute.) **(24)** Serial beginning Feb. 12.
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Actual Leakage in Unaccounted-for Gas.* Jacob D. von Maur. (Paper read before the Am. Gas Inst.) **(83)** Feb. 15.
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Calorimetry. S. W. Paur. (Paper read before the Indiana Gas Assoc.) **(24)** Feb. 19.
The Sturtevant Steam Turbine.* **(64)** Feb. 20.
High-Pressure Gas in Outlying Districts.* John Kennington. (Paper read before the Junior Gas Assoc.) **(66)** Feb. 20.
Structure and Heat Treatment of Tool Steel.* J. V. Emmons. (Paper read before the Metal Trades Superintendents and Foremen's Club.) **(20)** Feb. 22.
A Few Points Concerning By-Product Coke Ovens. R. Gillon. (Paper read before the National Assoc. of Colliery Mgrs.) **(22)** Feb. 23.
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*Illustrated.

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Tests of Portable Vacuum Cleaners.* C. A. Pierce. (27) Mar. 2.
A Combination Lighting, Heating and Ice Plant at Louisville, Ky.* (27) Mar. 2.
The Flow of Gas in Mains.* J. W. Batten. (Paper read before the Am. Gas Inst.) (24) Serial beginning Mar. 4.
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An Important Development of the Steam Engine.* Warren H. Miller. (46) Mar. 9.
Economic Aspects of the Smoke Nuisance.* John A. Switzer. (From *The Resources of Tennessee.*) (19) Mar. 9.
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L'Adhérence des Surfaces Planes.* H. Budgett. (Abstract of paper read before the Royal Society.) (92) Jan.
Recherches sur l'Ebullition, dans les Générateurs de Vapeur.* M. Emanaud. (33) Jan. 6.
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Standard Tests for Drain Tile and Sewer Pipe.* A. Marston. (89) Vol. 11.
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The Most Important Sewerage and Sewage Disposal Report Made in the United States (Pittsburgh). **(14)** Feb. 24; **(13)** Feb. 29.
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